INSTRUCTION MANUAL FOR MODEL 121

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G A S T U B E R E P L A C E M E N T

WARNING

The noise tube contains a slight amount of radio-active material. Thus, if the tube is broken it is important to clean the hands thoroughly after picking up the pieces. Actually the quantity of radio-active material in the tube is less than that on the luminous dial of a wrist watch, but if any radio-active material is taken into the body there could be injury.

OPERATING NOTES

NOISE SOURCE MODEL 121

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Stockholm. Sweden

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Contents

		Page
1.	Specifications	1
2.	Description	2
3.	Operation	2
4.	Maintenance	4

WAVEGUIDE NOISE SOURCES MODEL 121

Model	S121	S121A	G121	J121	H121	X121	P121	K121
Frequency2. Range(kMc/s)	2.60-3.95	3.3-4.9	3.95-5.85	5.3-8.2	7.05-10.0	8.2-12.4	12.4-18.0	18.0-26.5
Excess noise (dB)	15.35 ± .2	15.50 ± .2	15.50 ± .2	15.55 ± .2	15.56 ± .2	15.85 ± .2	15.85 ± .2	16.00 ± .2
Discharge current (mA)	200	175	175	175	175	175	175	175
VSWR *)	ON: 1.2 maximum 1.08 average OFF: 1.2 maximum 1.08 average							
Waveguide Type	RG 48/U WR 284 WG 10	WR229	RG49/U WR 187 WG 12	RG50/U WR 137 WG 14	RG51/U WR 112 WG 15	RG52/U WR 90 WG 16	RG91/U WR 62 WG 18	RG53/U WR 42 WG 20
Waveguide flange	UG 53/U	CPR229	UG149A/U	UG344/U	UG51/U	UG39/U	UG419/U	UG595/U
Approximate length	24" 600 mm	20" 500 mm	20" 500 mm	20" 500 mm	16 ¾" 425 mm	14¾" 375 mm	14¾" 375 mm	13 3/16" 335 mm
Argon gas tube	Signa-lite TD-38	Signa-lite TD-39	Signa-lite TD-39	Signa-lite TD-39	Signa-lite TD-72	Signa-lite TD-41	Signa-lite TD-41	Signa-lite TD-42
Cable Connector	BNC Type UG 932/U mates with BNC type UG 931/U							

*) Noise source terminated in a well-matched load such as that provided by the 912 series.

2. DESCRIPTION

The Magnetic Model 121 Noise Source consists of a gas-discharge tube mounted at an angle of approximately 10° in a section of waveguide. Care has been taken in the design of the noise source to achieve the high order of performance required in the accurate measurement of noise figure. The source presents a VSWR of less than 1.2 whether the tube is turned on or off. Spurious modes present because of the necessity of cutting into the guide for the tube are suppressed. The tube used is a cold-cathode type which is rated to have an excess noise power of about 15.5 dB. The gas tube gives a noise spectrum which is flat with frequency over the waveguide band.

Each end of the waveguide section is equipped with a cover-type flange. For optimum operation, the open end of the waveguide should be terminated with a low-reflection load, which has a VSWR of less than 1.02.

3. OPERATION

3.1 Operation with Noise Figure Meter Model 117

The Model 121 Noise Source is designed for use with the Model 117 (and 113) Noise Figure Meter, which supplies the required power.

1. Connect the 121 to the input of the device under test.
2. Terminate the other end of the waveguide section with a low-reflection load. If the source carries the designation TERMINATION on one end the load should be connected to this end.
3. Connect the Noise Source to the Noise Figure Meter GAS TUBE connector.
4. Read the discharge current on the noise figure meter instrument and adjust to the recommended value.

See: Noise Figure Meter Model 117, Operation.

3.2 DC Operation

The tubes used in the waveguide noise sources can be used for continuous (DC) operation, but they are designed primarily for pulse operation. Since the tube life will be shortened (500 hours) if the power dissipated in the cathode during DC operation exceeds that dissipated during pulse operation, it is recommended that for

continuous operation not more than half the recommended tube current for pulse operation be used. When a lower value of tube current is used, there will be a slight increase (less than 0.5 dB) in the excess noise available from the tube. The VSWR of the source may also be outside the specification. When the source is operated for long periods of time, DC-type tubes should be used.

Table 1 lists the different tube types available for the Model 121 Noise Source, these include tubes for pulse and CW operation and also high output tubes. (Neon-filled tubes with an excess noise of about 18 dB).

3.3 Sources of error

In some cases it is necessary to know the absolute value of noise figure. If so, consideration must be given to sources of error in the measurement.

The most important of the factors causing errors are:

1. Coupling and transmission line errors
2. Ambient or termination temperature different from 290°K
3. Receiver mismatch
4. Noise source mismatch

The first of these sources of error is a function of the coupling of the noise power source to the transmission line and the attenuation of the line. This can be estimated by measuring the hot and the cold transmission loss of the noise source. The decrease in excess noise can be computed from:

$$dP = 10 \log \left(1 - \frac{10 \log Ds}{10 \log Dt} \right) \times \left(1 - \frac{1}{Dt} \right) \text{ dB}$$

where,

Ds = cold transmission loss

Dt = hot transmission loss

(See also fig. 3.5 in the Model 113 Instruction Manual)

No correction is necessary with Noise Source Model 121 as the error is less than 0.25 dB.

The sources of error are treated in greater detail in the Model 113 Instruction Manual.

4. MAINTENANCE

The only replaceable part of Noise Source Model 121 is the discharge tube. The life is expected to be in the order of 2000 hours.

To remove the tube from the mount proceed as follows:

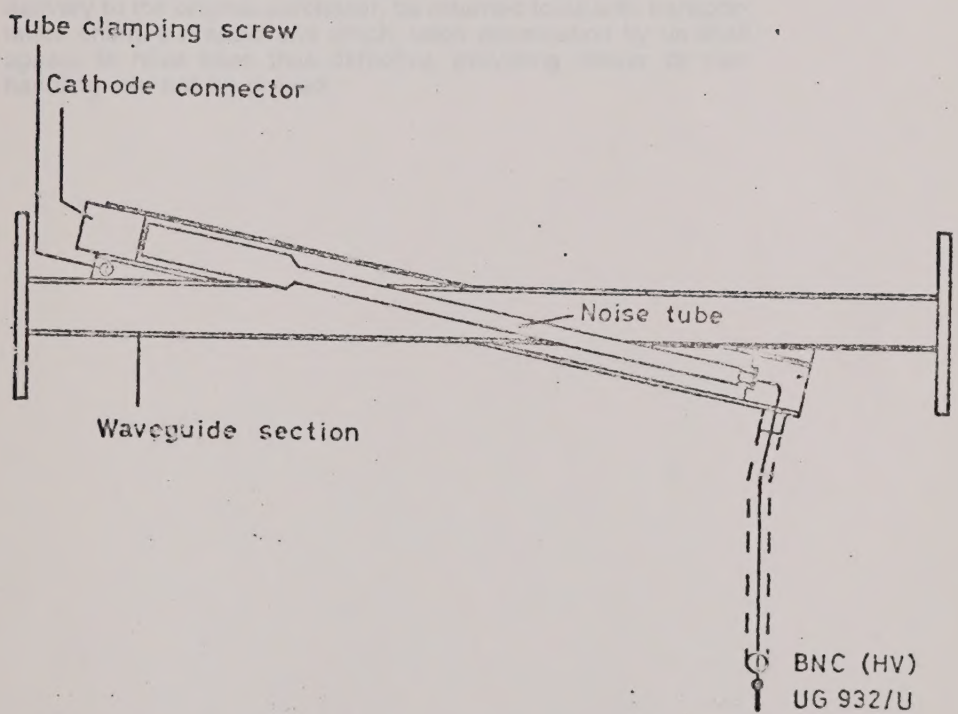
a. Loosen the tube clamping screw. (Cathode end)
b. Disengage the cathode connector from the tube.
c. Slip the tube out of its receptacle.
d. Insert a new tube in the receptacle, anode end first, and mate the tube and connector; tighten the tube clamping screw.

TABLE 1

Other Noise Tubes available for Noise Source Model 121

Bendix Tube number	Excess Noise x dB	Disch. Current mA	Tube Type		Freq. Band
TD-12	15,30	250	Kont.	Argon	S
TD-34	17,80	250	Kont.	Neon	S
TD-56	17,90	200	Puls	Neon	S
TD-10	15,60	250	Kont.	Argon	G
TD-48	17,70	250	Kont.	Neon	G
TD-43	17,85	200	Puls	Neon	G
TD-10	15,65	250	Kont.	Argon	J
TD-48	17,75	250	Kont.	Neon	J
TD-43	17,90	200	Puls	Neon	J
TD-11	15,60	200	Kont.	Argon	H
TD-23	18,00	200	Kont.	Neon	H
TD-44	17,90	175	Puls	Neon	H
TD-18	15,80	200	Kont.	Argon	X, P
TD-54	18,00	200	Kont.	Neon	X, P
TD-55	17,85	175	Puls	Neon	X, P

x As published by Signalite for tube-in-mount



Schematic diagram for Model 121 Noise Source

Principschema för bruskälla modell 121

Guarantee

Magnetic AB guarantees each equipment and component of its manufacture to be free from defects in material and workmanship for a period of 12 months. Our obligation under this guarantee is limited to servicing or adjusting any instrument returned to our factory for that purpose and to making good at our factory and parts thereof — except tubes, fuses, batteries, semiconductors and bolometers — which shall, within one year after making delivery to the original purchaser, be returned to us with transportation charges prepaid and which, upon examination by us shall appear to have been thus defective, providing misuse or mal-handling can not be proved.

RETURN PROCEDURE:

When returning instruments or components for repair, or for any other reason, please contact the company for shipping instructions. To expedite repair service, it is very important to provide **type number, serial number,** and a **detailed description of the reason for the return of the instrument.**

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